Summary of Amphibian and Reptile Surveys – 2001
North Mississippi Refuges Complex

During the spring and summer of 2001, refuge staff conducted amphibian and reptile surveys to assess the presence and absence of various species on Coldwater River, Dahomey, and Tallahatchie Refuges. Visual encounter surveys were conducted on all 3 sites. Additionally, calling anuran surveys and malformed amphibian surveys were conducted at Tallahatchie and Dahomey, and coverboard monitoring occurred at Tallahatchie Refuge.

Visual Encounter Surveys

Visual encounter surveys were the least rigorous of all surveys conducted during 2001. In this instance, the survey relied largely on chance detection of amphibians and reptiles, typically while the surveyor was out doing other jobs. Frequently included in this category are animals discovered as "road kill" and frogs heard calling outside of the "official" calling anuran surveys. This can be a very effective method to document presence an absence of species provided accurate data are kept. The majority of snakes and all turtles found were detected through this method. Visual encounter surveys were conducted on all 3 Refuges and was the only method used at Coldwater River Refuge.

Calling Anuran Surveys

Calling anuran surveys were conducted following the North American Amphibian Monitoring Program (NAAMP) protocol. Ten survey points were selected on both Tallahatchie and Dahomey refuges. Each point was located along a wetland and at least 0.5 miles from any other survey point. Figures 1 and 2 show the location of survey points. Surveys began at least 30 minutes after sunset and were completed by 1 a.m. At each survey point, the surveyor listened for 5 minutes and recorded the species present and the relative calling intensity (0 – 3 scale).

We conducted 2 surveys on Tallahatchie and Dahomey refuges (late spring and summer). A total of 9 species were detected overall. Eastern narrowmouth toads (*Gastrophryne carolinensis*) were only detected at Dahomey and bird-voiced treefrogs (*Hyla avivoca*) were only detected at Tallahatchie. In general, cricket frogs (*Acris crepitans*) and green treefrogs (*H. cinerea*) occurred in large numbers (index value of 3) where they occurred. Ranid frogs such as green frogs (*Rana clamitans*) and bullfrogs (*R. catesbeiana*) were generally present in much lower numbers. These species typically need permanent water to breed and are more likely to have been affected by the drought of the previous several years. Although they are likely to occur in these areas, spring peepers (*Pseudacris crucifer*), upland chorus frogs (*P. triseriata feriarum*), American toads (*Bufo americanus*), and pickerel frogs (*R. palustris*) were not detected. Neither refuge was surveyed in early spring which is when these species are most likely to breed. These surveys will be continued during the 2002 field season and expanded to include an early spring survey for each refuge.

Additional surveys were conducted along 8 official NAAMP routes throughout the state. A total of 14 NAAMP routes were ground-truthed in preparation for additional

volunteers. (Ground-truthing involves driving the computer-generated route and selecting the survey points.)

Malformed Amphibian Surveys

Malformed amphibian surveys were conducted on Dahomey and Tallahatchie Refuges in May and July. At each site, 79 – 127 newly metamorphosed frogs were captured and placed in a large Rubbermaid container containing debris and water from the site. Once enough animals had been captured, each individual was measured (snout-urostyle length and tail length where applicable). The animal was then examined for any abnormality. Any individual displaying an abnormality was held in a separate container and later preserved. All "normal" individuals were released back at the capture site.

Dahomey sites surveyed included a site along North Gravel Road 1.1 miles north of the gate (MF-2), a culvert just east of the headquarters building and north of Highway 446 (MF-4), and the rice fields on the south side of Dahomey (near the well) (MF-5). Southern leopard frogs (*R. utricularia*) were collected and examined at sites MF-2 and MF-4, while toads (*Bufo* sp.) and green treefrogs were collected and examined at site MF-5. The only site surveyed on Tallahatchie was a pothole-type wetland located northeast of the Army Corps of Engineers structure on Tippo Bayou (MF-1). Southern leopard frogs were collected and examined at this site. Table 1 below summarizes survey results.

Table 1: Summary of malformed amphibian surveys conducted at Dahomey and Tallahatchie Refuges.

Date	Site	Species	Number	# abnormal	% abnormal	Avg. body length (mm)	Avg. tail length (mm)
5/7/01	MF-2	So. Leopard frog	108	7	6.48%	21.92	6.99
5/9/01	MF-4	So. Leopard frog	79	1	1.27%	24.57	31.09
5/25/01	MF-1	So. Leopard frog	107	2	1.87%	21.40	0.33
7/5/01	MF-5	Toad species	123	11	8.94%	13.38	0.5
7/18/01	MF-5	Green treefrog	101	17	16.83%	20.78	1.72

In general, an abnormality rate of less than 5% is considered acceptable—it can be dismissed as a result of normal genetic mutation. Two of the 4 sites surveyed had abnormality rates above this 5%, the Dahomey rice field (MF-5) and the site along North Gravel Road (MF-2). The majority of abnormal individuals (5/7) found at site MF-2 were missing toes. There was some evidence that at least several of these abnormalities were a result of predation. The 2 surveys conducted at site MF-5, however, revealed more extreme abnormalities, particularly among the green treefrogs. Among the 11 abnormal toads collected 3 were missing one or more toes, 5 were missing part or all of a leg, 1 had a broken leg (probably a result of collection), 1 had a curled hind foot, and one had bone bridges and/or rotation in both hind legs. Among 17 abnormal green treefrogs captured at this site, 5 were missing one or more toes and the remaining 12 were missing part of one or both hind limbs. One individual was completely missing its right leg and was missing the left leg below the knee.

In order to accurately assess whether abnormalities are a result of predation or are developmental malformations, the specimens must be x-rayed. The original intent of this project was to send any abnormal individuals to the National Wildlife Health Center in Madison, WI to be x-rayed. This survey was coordinated by the Lafayette ES office and we are currently awaiting notification from them to move forward with abnormality assessment. Funding was provided by the USFWS Region 4 Regional Office in Atlanta, GA.

Coverboard Monitoring

Coverboard monitoring occurred solely on Tallahatchie Refuge as a field trial. Five arrays of 4 coverboards were placed in several habitat types throughout the Refuge. Coverboards were constructed of 2' x 4' pieces of 3/8" plywood which were laid on bare ground. (Leaf litter was raked away so that the board contacted bare dirt.) These coverboards were checked approximately every 2 weeks from mid-April to mid-July. Use was fairly low, which is typical of coverboard monitoring, particularly the first season. However, during the course of monitoring, we found 3 southern leopard frogs, 2 yellow-bellied water snakes (*Nerodia erythrogaster flavigaster*), 1 five-lined skink (*Eumeces fasciatus*), and 2 ground skinks (*Scincella lateralis*). This was the only survey method used this year which detected any species of lizard.

Summary

During the 2001 field season, staff and volunteers at the North Mississippi Refuges Complex conducted amphibian and reptile surveys on Refuge properties. To date we have verified the presence of 9 species of frogs, 6 species of turtles, 2 species of lizards, and 11 species of snakes. Appendix A lists species which potentially occur in northern Mississippi and the species which were found on each of the Refuges. We will continue to survey during the 2002 field season and hope to expand our methods to detect additional species.

Figure 1: Frog survey points on Tallahatchie National Wildlife Refuge

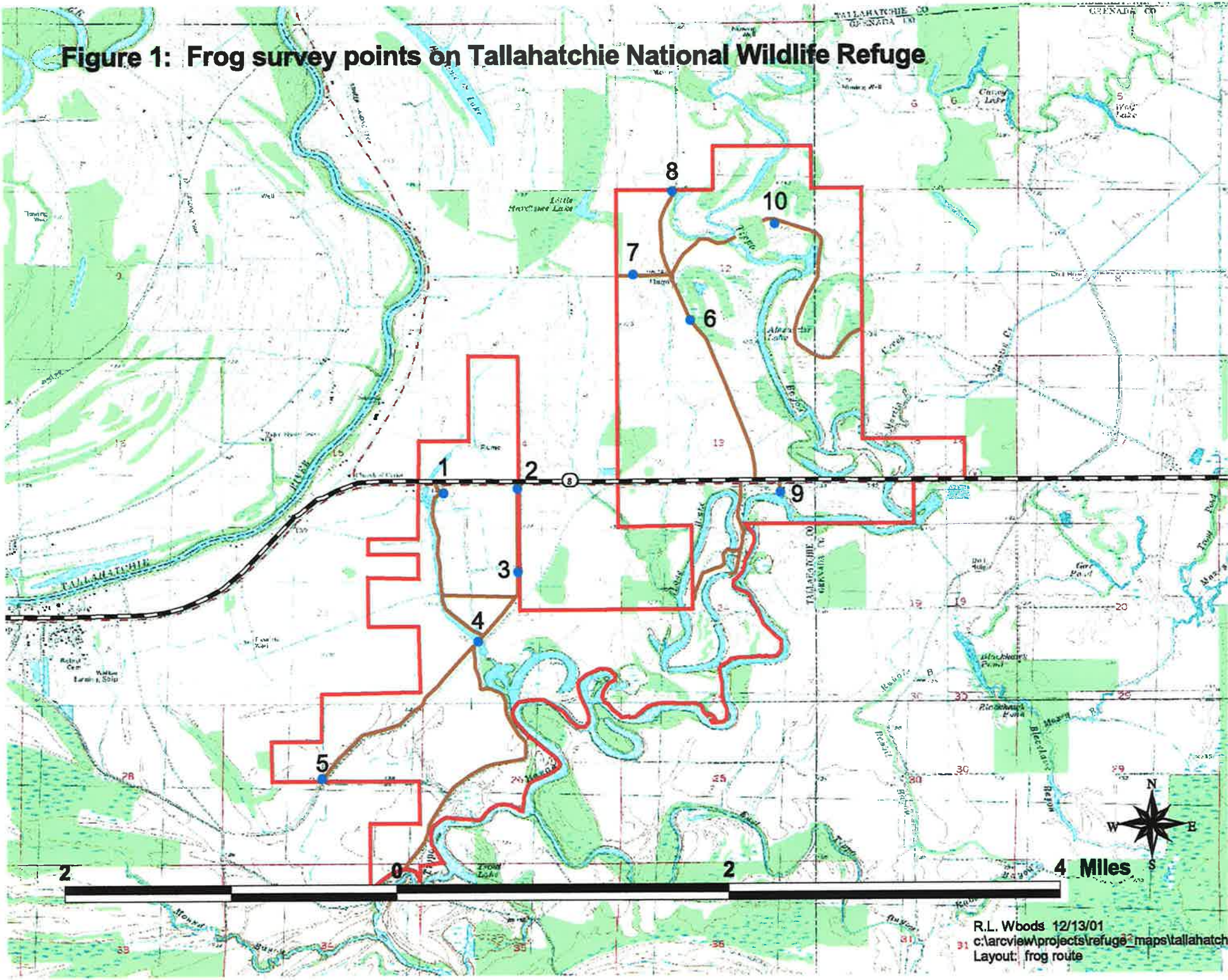
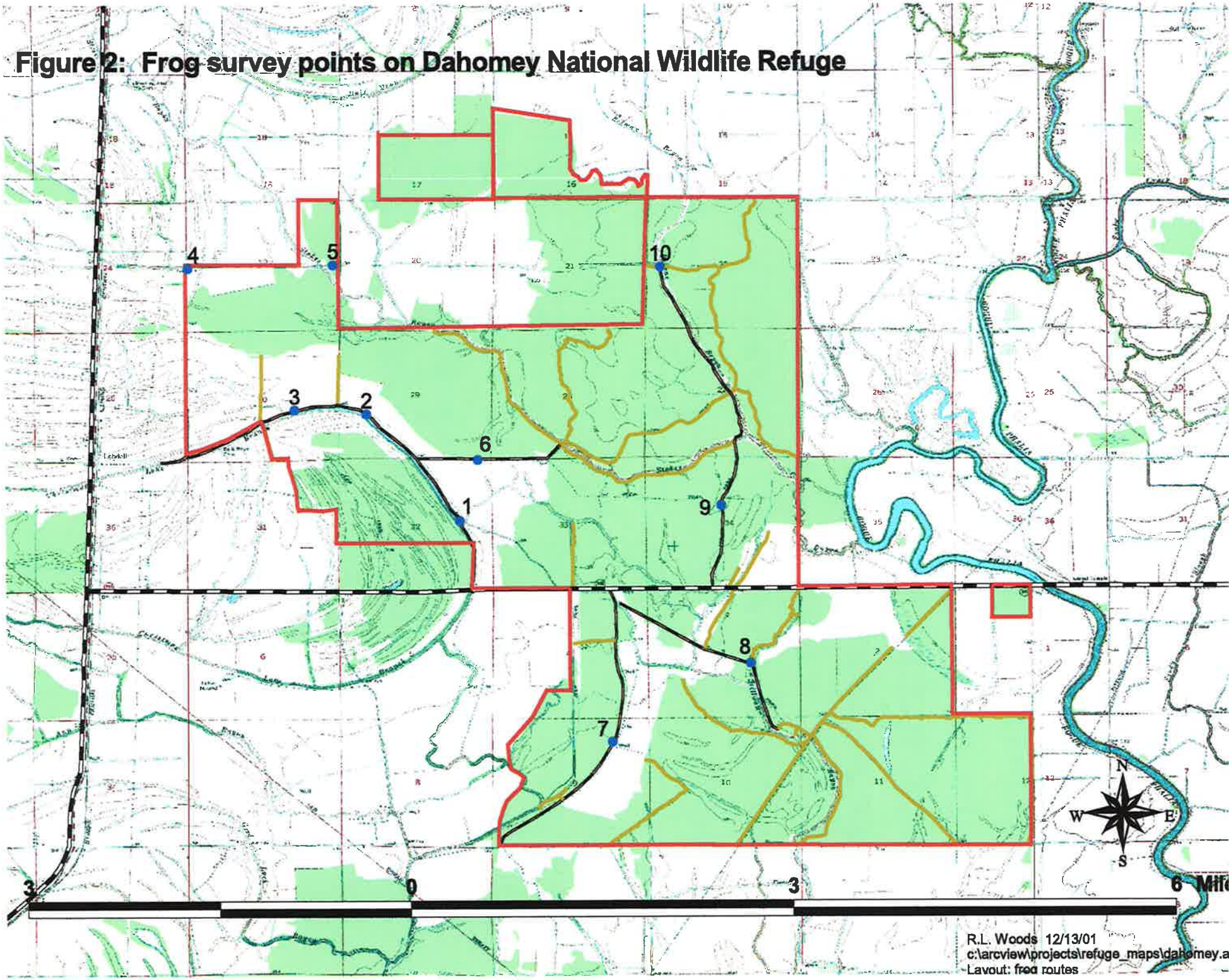


Figure 2: Frog survey points on Dahomey National Wildlife Refuge



Amphibian and Reptile Checklist
North Mississippi Refuge Complex

Appendix A

		CWR	DAH	TAL
Spadefoot toads	**Pelobatidae**			
Eastern spadfoot toad	*Scaphiopus holbrookii*			
Narrowmouth toads	**Microhylidae**			
Eastern narrowmouth toad	*Gastrophryne carolinensis*		X	
Toads	**Bufonidae**			
American toad	*Bufo americanus*			
Southern toad	*Bufo terrestris*			
Fowler's toad	*Bufo woodhousii fowleri*		X	X
Treefrogs	**Hylidae**			
Green treefrog	*Hyla cinerea*	X	X	X
Bird-voiced treefrog	*Hyla avivoca*			X
Gray treefrog	*Hyla versicolor*			
Cope's gray treefrog	*Hyla chrysoscelis*		X	X
Upland chorus frog	*Pseudacris triseriata feriarum*			
Northern spring peeper	*Pseudacris crucifer*			
Northern cricket frog	*Acris crepitans*	X	X	X
Southern cricket frog	*Acris gryllus*			
True frogs	**Ranidae**			
Bronze frog	*Rana clamitans*		X	X
Bullfrog	*Rana catesbeiana*	X	X	X
Southern leopard frog	*Rana utricularia*	X	X	X
Northern crawfish frog	*Rana areolata*			
Pickerel frog	*Rana palustris*			
Sirens	**Sirenidae**			
Western lesser siren	*Siren intermedia*			
Amphiumas	**Amphiumidae**			
Three-toed amphiuma	*Amphiuma tridactylum*			
Newts	**Salamandridae**			
Central newt	*Notophthalmus viridescens*			
Mole salamanders	**Ambystomatidae**			
Mole salamander	*Ambystoma talpoideum*			
Smallmouth salamander	*Ambystoma texanum*			
Spotted salamander	*Ambystoma maculatum*			
Marbled salamander	*Ambystoma opacum*			

Amphibian and Reptile Checklist
North Mississippi Refuge Complex

Appendix A

		CWR	DAH	TAL
Lungless salamanders	**Plethodontidae**			
Spotted dusky salamander	*Desmognathus fuscus*			
Southern red salamander	*Pseudotriton ruber*			
Mississippi slimy salamander	*Plethodon glutinosus*			
Southern two-lined salamander	*Eurycea cirrigera*			
Three-lined salamander	*Eurycea longicauda*			
Alligators	**Alligatoridae**			
American alligator	*Alligator mississippiensis*			
Snapping turtles	**Chelydridae**			
Alligator snapping turtle	*Macroclemys temminckii*			
Common snapping turtle	*Chelydra serpentina*	X		X
Musk turtles	**Kinosternidae**			
Common musk turtle	*Sternotherus odoratus*			
Razorback musk turtle	*Sternotherus carinatus*			
Eastern mud turtle	*Kinosternon s. subrubrum*			
Mississippi mud turtle	*Kinosternon s. hippocrepis*			
Mud turtle sp.	*Kinosternon subrubrum*	X		
Box and water turtles	**Emydidae**			
Ouachita map turtle	*Graptemys pseudogeographica*			
Mississippi map turtle	*Graptemys kohnii*			X
Southern painted turtle	*Chrysemys picta*			
River cooter	*Pseudemys concinna*			X
Red-eared slider	*Trachemys scripta*	X		X
Three-toed box turtle	*Terrapene carolina*		X	
Midland smooth softshell turtle	*Apalone mutica*			
Spiny softshell turtle	*Apalone spinifera*			
Iguanian Lizards	**Iguanidae**			
Green anole	*Anolis carolinensis*			
Northern fence lizard	*Sceloperus undulatus*			
Skinks	**Scincidae**			
Ground skink	*Scincella lateralis*			X
Five-lined skink	*Eumeces fasciatus*			X
Broadhead skink	*Eumeces laticeps*			
Southeastern five-lined skink	*Eumeces inexpectatus*			
Whiptails	**Teiidae**			
Six-lined racerunner	*Cnemidophorus sextineatus*			
Glass lizards	**Anguidae**			
Eastern glass lizard	*Ophisaurus attenuatus*			

		CWR	DAH	TAL
Colubrids	**Colubridae**			
Midland water snake	*Nerodia sipedon pleuralis*		X	
Broad-banded water snake	*Nerodia fasciata confluens*		X	
Yellowbelly water snake	*Nerodia erythrogaster flavigaster*			X
Diamondback water snake	*Nerodia rhombifer*		X	
Mississippi green water snake	*Nerodia cyclopion*			
Graham's crayfish snake	*Regina grahamii*			
Eastern garter snake	*Thamnophis sirtalis*		X	
Eastern ribbon snake	*Thamnophis sauritus*			
Western ribbon snake	*Thamnophis proximus*	X	X	X
Midland brown snake	*Storeria dekayi*			
Rough earth snake	*Virginia striatula*			
Western smooth earth snake	*Virginia valeriae*			
Mississippi ringneck snake	*Diadophis punctatus*			
Eastern hognose snake	*Heterodon platirhinos*			
Midwest worm snake	*Carphophis amoenus*			
Northern scarlet snake	*Cemophora coccinea*			
Rough green snake	*Opheodrys aestivus*			
Western mud snake	*Farancia abacura*		X	
Blackmask racer	*Coluber constrictor latrunculus*		X	
Black rat snake	*Elaphe o. obsoleta*			
Gray rat snake	*Elaphe o. spiloides*			
Rat snake sp.	*Elaphe obsoleta*		X	
Corn snake	*Elaphe guttata*			
Red milk snake	*Lampropeltis triangulum*			
Scarlet kingsnake	*Lampropeltis triangulum*			
Prairie kingsnake	*Lampropeltis calligaster*			
Mole kingsnake	*Lampropeltis calligaster*			
Speckled kingsnake	*Lampropeltis getula holbrooki*	X		
Pit vipers	**Viperidae**			
Western cottonmouth	*Agkistrodon piscivorus*		X	X
Southern copperhead	*Agkistrodon contortrix*			
Western pigmy rattlesnake	*Sisturus miliarius*			
Timber rattlesnake	*Crotalus horridus*			

Amphibian and Reptile Survey Protocols
North Mississippi Refuges Complex

Calling Frog Survey Protocol

Purpose

This survey is designed to determine the presence and absence of various frog species throughout the year. It also provides a means to compare relative abundance between sites and between years.

Target Species

Any species of anuran (frogs and toads) has the potential to be detected using this survey.

Sampling periods

There are three seasonal sampling periods designed to cover the calling periods of all species. Each sampling window is 30 - 45 days long with a 2-week interval between sampling periods. Our sampling windows are as follows:

1st	2nd	3rd
Feb. 20 – Mar. 31	Apr. 15 – May 15	June 1 – July 1

Surveys should be conducted on the first available night when conditions are right (see below for survey conditions).

Nightly sampling conditions

A survey should begin 30 minutes or more after sunset and be completed no later than 1 a.m. Appropriate sampling conditions are based on wind, sky, and air temperature conditions. Wind should be at level 3 or less and surveys should not be conducted during heavy rainfall or during a thunderstorm. (Frogs frequently call less when it's windy and heavy rains/thunderstorms may prevent you from hearing the frogs.)

The air temperature criteria are the minimum allowable temperatures, varying for each sampling period. Those temperatures are as follows:

	Minimum Temperature
First period	5.6 °C (42 °F)
Second period	10 °C (50 °F)
Third period	12.8 °C (55 °F)

In general, humid nights and nights following a period of rain are the best nights to survey frogs.

Data collection

Stops are conducted in numerical order, in one night by one observer. Because survey ability varies between observers, it is encouraged (though not required) that the same observer conducts all surveys of a route in a given year. If friends accompany you on a survey and would like to collect data also, they should fill out a separate datasheet and should not contribute to your observations. This allows each survey conducted to be of equal effort.

Your presence at the wetland could affect the calling intensity of the frogs. Please remain at the roadside during the survey and don't venture out into the wetland. Feel free to return once you have completed the survey. However, the surveys themselves should be conducted from the roadside and not from the bank of the wetland.

If you hear a frog you are unable to identify or that you think should not be found along the route, feel free to make a recording for verification. Any night birds heard calling from survey points should be noted in the "additional notes" section on the front of the data sheet.

Below is the basic protocol for conducting a survey.

1. Prior to starting your survey, fill out the front of the datasheet (route information and observer information).
2. When you arrive at your first survey point, record the time and check the appropriate boxes for sky and wind codes.
3. Walk a short distance from your vehicle (along the road) then listen for 5 minutes. After the 5 minute survey period is over, record the species heard and a calling index value for each species. Also record the temperature, and the noise index value.
4. Proceed to your next stop and repeat step 3.
5. After you survey site 10, record the time and check the appropriate boxes for sky and wind codes. Double-check your datasheet to be certain that all data are in the appropriate row and column.

Amphibian Calling Index

1 – Individuals can be counted; there is space between calls
2 – Calls of individuals can be distinguished but there is some overlapping of calls
3 – Full chorus, calls are constant, continuous and overlapping

Note: Frequently individuals will stop and start calling during the listening period. Record the maximum calling index heard during the listening period. (i.e. if the frogs were chorusing at one point during the listening period, record it as a "3", even if they were silent by the end.)

Beauford Wind Codes

0 – Calm (< 1 mph) smoke rises vertically
1 – Light Air (1 – 3 mph) smoke drifts, weather vane inactive
2 – Light Breeze (4 – 7 mph) leaves rustle, can feel wind on face
3 – Gentle Breeze (8 – 12 mph) leaves and twigs move around, small flags extend
4* - Moderate Breeze (13 – 18 mph) moves thin branches, raises loose papers

* Do not conduct a survey at level 4 or greater.

Sky Codes

0 – Few clouds
1 – Partly cloudy (scattered) or variable sky
2 – Cloudy or overcast
4 – Fog or smoke
5 – Drizzle or light rain (not affecting hearing ability)
7 – Snow
8 – Showers (is affecting hearing ability) – *Do not conduct survey*

Noise Index

0 – No appreciable effect (e.g. owl calling)
1 – Slightly affecting sampling (e.g. distant traffic, dog barking, one car passing)
2 – Moderately affecting sampling (e.g. nearby traffic, 2 – 5 cars passing)
3 – Seriously affecting sampling (e.g. continuous traffic nearby, 6 – 10 cars passing)
4 – Profoundly affecting sampling (e.g. continuous traffic passing, construction noise)

If there is a major noise disturbance nearby, lasting one minute or longer, you may break the listening period to avoid sampling during the excessive noise. If such a time-out is taken, please note it on the datasheet. After the disturbance ends, resume the listening period and finish up with the remaining time.

Coverboard Monitoring Protocol

Purpose

To determine reptile and amphibian species present on Refuge lands and to test the suitability of this method as a survey technique.

Target Species

Any species of lizard, snake, salamander, or frog may be detected using this method.

Sampling Periods

Five arrays of 4 boards will be placed on each Refuge. These boards will be monitored approximately every other week beginning in March and going through October. Boards will not be checked in July and August. (Boards are less likely to be used during that time period.) Boards will be left out between sampling periods and allowed to weather. All arrays and all boards should be marked with stake flagging to assist with locating them.

Data Collection

During coverboard checks, use a snake hook to lift up the far edge of the board and pull it towards you. This provides protection in case there is a snake underneath the board. If an animal is observed, record the array number, board number, date, and species. Additional information (size, sex, etc.) may be recorded if desired, but is not necessary.

Amphibian and Reptile Trapping Protocol
(Drift Fences and Funnel Traps)

Purpose

To determine amphibian and reptile species present on Dahomey.

Target Species

Any species of lizard, snake, frog, or salamander could be captured using this technique. This survey is particularly effective at detecting the presence of large snakes and frogs.

Sampling Periods

Drift fences will be operated beginning in February, continuing through May and then resuming in September. This trapping is highly weather dependent. Attempts will be made to operate the traps during and after rain events to maximize trapping success. Traps will not be operated when the minimum temperature is less than 40°F or when the maximum temperature is over 80°F.

Trapping will occur only at Dahomey near the southwestern end of the Well Road at existing drift fences. Sampling periods will consist of 3 consecutive days and traps will be checked each morning during the sampling period.

Data Collection

Two drift fences approximately 30 meters long are currently in place along the Well Road Slough, on either side of a drainage ditch. Funnel traps will be placed on either side of each fence 10 – 15 meters apart. Funnel traps are constructed out of 36" wide aluminum screening, rolled into cylinders with a screen funnel at either end. Traps will be checked daily (mornings) during each sampling periods. When traps are not in use, one end will be clipped open to allow any animal to escape.

To check traps, look into the trap and invert each funnel to find any smaller amphibians which may be hiding. When an animal is detected, one funnel should be unclipped enough to remove the animal. Record the location, date, species, and sex (if known) for each animal. Captured individuals should be released on the opposite side of the fence, at least 10 meters from the fence.

When checking the funnel traps, use caution and watch out for cottonmouths. Any venomous snake captured should not be directly handled. (The trap can be tilted on one end, the funnel completely removed, and dumped, using a snake hook when working at the end of the trap where the snake is.)

Turtle Trapping Protocol

Purpose

Determine the species of turtles present on the North Mississippi National Wildlife Refuges.

Target Species

Any species of aquatic turtle may be detected using this protocol.

Sampling Periods

Trapping will begin in March and continue through July, weather permitting. Minimum nighttime temperatures should be above 50°F while trapping. Traps should be pulled during periods of heavy rainfall.

Trapping will focus primarily on Dahomey, Coldwater River, and Tallahatchie Refuges proper, and not on associated FmHA Tracts. Each refuge will be trapped for 3 consecutive days before relocating the traps to the next area. Ideally traps will be checked each morning. If predator-related mortality occurs, traps will be pulled for that trapping period. Each trapping period for an area will use different trap sites to try to maximize potential captures.

Data Collection

1. Each trap should be anchored with several inches of the trap above the water line. Traps should be baited with fish and/or watermelon. (Most turtles respond to fish as bait, but soft-shells will respond to watermelon.)
2. When checking the trap, pull the entire trap out of the water to determine if it contains turtles. If there are no turtles present, rebait the trap and move to the next one. If there are turtles present, pull the trap onto the bank (or into the boat).
3. Carefully remove the turtles one at a time. For each turtle, record the species, sex (if it can be determined), age class, date, mark, and trap site. If the turtle has not been captured previously, mark it by filing into the marginal scutes. Turtles should be given a date-specific mark, based on the day they were captured.
4. A recaptured turtle should have the above information recorded and should have an additional marginal scute marked to indicate that it has been captured previously.
5. Release each turtle after marking. Rebait the trap and reset it. If it is the last day of the trapping period, pull the trap.